Connecting Mechanism

CLAIMS

1. Connecting mechanism (1) for two parts (2, 3), which are at least partially insertable into one another, with a cam-operated component (6), which runs on bearings on the one part (2) and is adjustable between a passive and active position (4, 5) for shifting a number of contact elements (7, 8, 9) between a withdrawal and a contact position (10,11), whereby the contact elements (7, 8, 9), when in the contact position (11), mesh in a retaining indentation (12) on the other part (3), and with a driving device (13) for the adjustment of the cam-operated component (6) between the active and passive position (4, 5), **characterised in that** the contact elements (7, 8, 9) are allocated in two or more levels (14, 15, 16) essentially parallel to the insertion direction (17) of the two parts (2, 3) and the cam-operated component (6) for shifting the contact elements (7, 8, 9) between the withdrawal and contact positions (10, 11) is allocated to each level (14, 15, 16).

2. Connecting mechanism according to Claim 1, **characterised in that** the parts (2, 3) that are insertable into one another are tubular.

3. Connecting mechanism according to Claim 1 or 2, **characterised in that** this mechanism (1) is arranged in the interior (18) of the one part (2) and, in particular, in its wall (19), whereby the other part (3) can be inserted, with at least one end (21), into a longitudinal bore hole (20) of the one part (2).

4. Connecting mechanism according to one of the previous claims, **characterised in that** the cam-operated component (6) presents at least one cam ring (22), rotatably running on bearings, with sliding cams (23) on an inner surface of the ring (24).

5. Connecting mechanism according to one of the previous claims, **characterised in that** a cam ring (22) is allocated to each level (14, 15, 16) of contact elements (7, 8, 9).

6. Connecting mechanism according to one of the previous claims, **characterised in that** the contact elements (7, 8, 9) run in bearings in a supporting ring (25, 26, 27) in such a way that they are adjustable between the withdrawal and contact positions (10, 11).

7. Connecting mechanism according to one of the previous claims, **characterised in that** a supporting ring (25, 26, 27) is allocated to each level (14, 15, 16).

8. Connecting mechanism according to one of the previous claims, **characterised in that** the sliding cams (23) are formed on the inner surface of the ring (24) as a link guide (28).

9. Connecting mechanism according to one of the previous claims, **characterised in that** the contact element (7, 8, 9), with a locating element (29) that runs on bearings so that it is especially rotatable, is in contact with the inner surface of the ring (24).

10. Connecting mechanism according to one of the previous claims, **characterised in that** the contact element (7, 8, 9) is force- and, in

particular, spring-pressurised in the direction of the withdrawal position (10).

11. Connecting mechanism according to one of the previous claims, **characterised in that** the contact elements (7, 8, 9) of different levels (14, 15, 16) present contact positions (11) that are shifted in different amounts, at least radially towards the interior.

12. Connecting mechanism according to one of the previous claims, **characterised in that** the contact elements (7, 8, 9) of one level (14, 15, 16) present contact positions (11) that are shifted at least in different amounts radially towards the interior.

13. Connecting mechanism according to one of the previous claims, **characterised in that** the contact elements (7, 8, 9) of different levels (14, 15, 16) are arranged offset to one another in the circumferential direction (30).

14. Connecting mechanism according to one of the previous claims, **characterised in that** pivot bearings (31), in particular ball bearings, are arranged between adjacent cam rings (22).

15. Connecting mechanism according to one of the previous claims, **characterised in that** the cam ring (22) presents a guide slot (33) that runs in the direction of rotation (32), through the ends (34, 35) of which essentially the passive and active positions (4, 5) of the cam ring (22) are determined.

16. Connecting mechanism according to one of the previous claims, **characterised in that** the cam ring (22) presents a gearing (37) at least along one part of its outside circumference (36), with which a pinion (38) that can be rotated by the driving device (13) meshes.

17. Connecting mechanism according to one of the previous claims, **characterised in that** each cam ring (22) is driven separately.

18. Connecting mechanism according to one of the previous claims, **characterised in that** the driving device (13) presents at least one electric motor (39), whose driven shaft (40, 41) has a driving connection with the pinion (38).

19. Connecting mechanism according to one of the previous claims, **characterised in that** several electric motors (39) are allocated to the driven shaft (40, 41).

20. Connecting mechanism according to one of the previous claims, **characterised in that** two or more driven shafts (40, 41) with one or more electric motors (39) are arranged in the circumferential direction (30) of the cam ring (22) at a distance from one another.

21. Connecting mechanism according to one of the previous claims, **characterised in that** pinions (38) with a driving connection to different driven shafts (40, 41) are meshed with different cam rings (22).

22. Connecting mechanism according to one of the previous claims, **characterised in that** a step-down gear unit (42,), in particular, a so-

called harmonic drive (43), is arranged between the driven shaft (40, 41) and pinion (38).

23. Connecting mechanism according to one of the previous claims, **characterised in that** the contact element (7, 8, 9) presents a concave curved inner surface (44) and/or is formed essentially wedge-shaped running in the direction radially inwards relative to the supporting ring (25, 26, 27).

24. Connecting mechanism according to one of the previous claims, **characterised in that** the one part (2) presents at least one retainer bore hole (46) for the driving device (13) in its wall (19), in its insertion end (45) for the other part (3).

25. Connecting mechanism according to one of the previous claims, **characterised in that** the wall (19) on the insertion end (45) presents an interior ring clearance zone (47), in which an insertion sleeve (48) is attached in a way that it can be detached, which is formed at least for the rotatable support of the cam rings (22) and for the support of the supporting rings (25, 26, 27).

26. Connecting mechanism according to one of the previous claims, **characterised in that** the retaining indentation (12) in the other part (3) is formed as a revolving snap ring groove (49).

27. Connecting mechanism according to one of the previous claims, **characterised in that** the retaining indentation (12) in the other part (3) is expanded in the direction of the contact element (7, 8, 9).

28. Connecting mechanism according to one of the previous claims, **characterised in that** the contact element (7, 8, 9) is essentially formed so that it is claw- or latch-shaped.

29. Connecting mechanism according to one of the previous claims, **characterised in that** two pivot bearings (31) are arranged on each side of a bearing shaft (50) that has a driving connection with the driven shaft (40, 41) for the pinion(s) (38) in the circumferential direction (30) of the cam ring (22).

30. Connecting mechanism according to one of the previous claims, **characterised in that** the position of the driven shaft (40, 41) and/or bearing shaft (50) and/or pinion (38) and/or cam ring (22) and/or contact element (7, 8, 9) can be registered by means of a position sensor (51).

31. Connecting mechanism according to one of the previous claims, **characterised in that** the driven shafts (40, 41) are mechanically synchronised in their rotational movements.